# GuardMaster MSR57P Speed Monitoring Safety Relay

Catalog Number 440R-S845AER-NNL



## Dimensions



99 mm (3.9 in.)

114.5 mm (4.51 in.)

67.5 mm (2.66 in.)
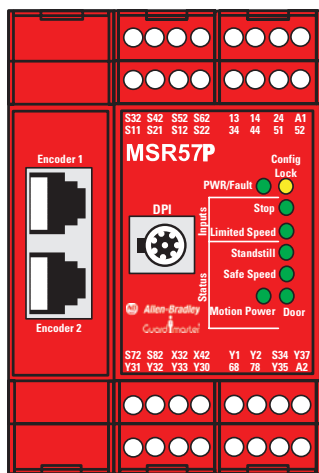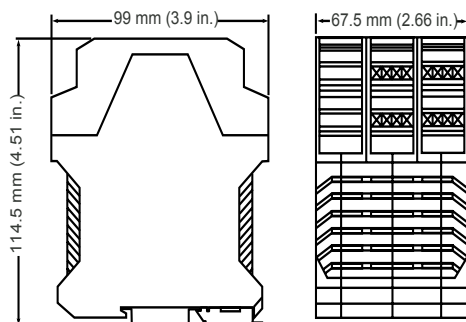
## Additional Resources

| Resource | Description |
|---|---|
| GuardMaster MSR57P Speed Monitoring Safety Relay User Manual, publication 440R-UM004 | Detailed information on wiring, configuring, and operating an MSR57P relay, including safety requirements. |

You can view or download publications at http://literature.rockwellautomation.com. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

## Installation Instructions in Other Languages

| English | This instruction sheet is available in multiple languages at http://rockwellautomation.com/literature. Select publication language and type "MSR57P" in the search field. |
|---|---|
| Deutsch | Dieses Instruktionsblatt kann in mehreren Sprachen unter http://rockwellautomation.com/literature gelesen werden. Bitte Ihre Sprache anwählen und "MSR57P" im Suchfeld eintippen. |
| Français | Ces instructions sont disponibles dans différentes langues à l'adresse suivante: http://rockwellautomation.com/literature. Sélectionner la langue puis taper << MSR57P >> dans le champ de recherche. |
| Italiano | La presente scheda d'istruzione è disponibile in varie lingue sul sito http://rockwellautomation.com/literature. Selezionare la lingua desiderata e digitare "MSR57P" nel campo di ricerca. |
| Español | Puede encontrar esta hoja de instrucciones en varios idiomas en http://rockwellautomation.com/literature. Seleccione el idioma de publicación y escriba "MSR57P" en el campo de búsqueda. |
| Português | Esta folha de instruções está disponível em várias línguas em http://rockwellautomation.com/literature. Seleccione a língua de publicação e entre com "MSR57P" no espaço de busca. |
| Polish | Ta kartka z instrukcjami jest dostepna w wielu jezykach na stronie: http://rockwellautomation.com/literature. Wybierz jezyk publikacji i wpisz w polu poszukiwania "MSR57P". |
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| Swedish | Detta instruktionsblad finns på olika språk på http://rockwellautomation.com/literature. Välj önskat språk och skriv "MSR57P" i sökrutan. |
| Dutch | Dit instructieblad is beschikbaar in diverse talen op: http://rockwellautomation.com/literature. Kies taal van publicatie en tik "MSR57P" in het zoekveld. |
| Chinese (complex) | 從以下網頁可以獲得本說明書的多種語言的版本：http://rockwellautomation.com/literature 。請選擇出版物的語言，並在搜索欄輸入 "MSR57P"。 |
| Chinese (simplified) | 从以下网页可以获得本说明书的多种语言的版本：http://rockwellautomation.com/literature 。请选择出版物的语言，并在搜索栏输入 "MSR57P 印 |
| Japanese | 本説明書シートの多言語版はWebサイト http://rockwellautomation.com/literature にて入手できます。出版言語を選択し、検索フィールドに 「MSR57P」とタイプしてください。 |

# General Safety Information

Retain these instructions for future reference. Rockwell Automation cannot accept responsibility or liability for a failure of this device if the product is used outside the recommended specifications in this document.

| **ATTENTION** ⚠ | This device is intended to be part of the safety-related control system of a machine. Before installation, a risk assessment should be performed to determine whether the specifications of this device are suitable for all foreseeable operational and environmental characteristics for the machine to which it is to be fitted. At regular intervals during the life of the machine, check whether the characteristics foreseen remain valid. |
|---|---|

| **ATTENTION** ⚠ | **Safety Programmable Electronic Systems (PES)**<br>Personnel responsible for the installation and application of safety-related programmable electronic systems (PES) shall be aware of the safety requirements in the application of the system and shall be trained in using the system. |
|---|---|

# Spacing Requirements

Adequate air space must be provided around the system (module cluster). Minimum recommended clearances:

- 15 mm (0.6 in.) above
- 15 mm (0.6 in.) below
- 2…3 mm (0.08…0.12 in.) between modules at ambient temperatures higher than 40 °C (104 °F).

# Mount the MSR57P Relay

Follow these steps to mount the MSR57P relay to an EN50022 -35 x 7.5 DIN rail.

1. Hook the top slot over the DIN rail.

2. Snap the bottom of the device into position while pressing the device down against the top of the rail.

3. Attach end plates on each end of the DIN rail.
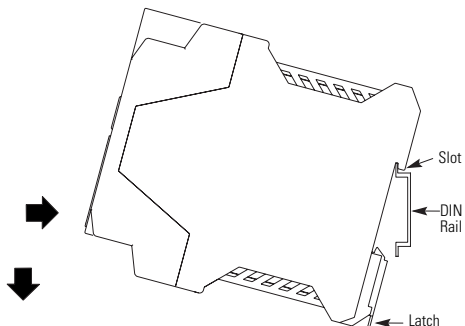
To remove the device from the DIN rail, use a flathead screwdriver to pull down the latch and lift the device from the rail.



Slot

DIN Rail

Latch

# Circuit Diagram
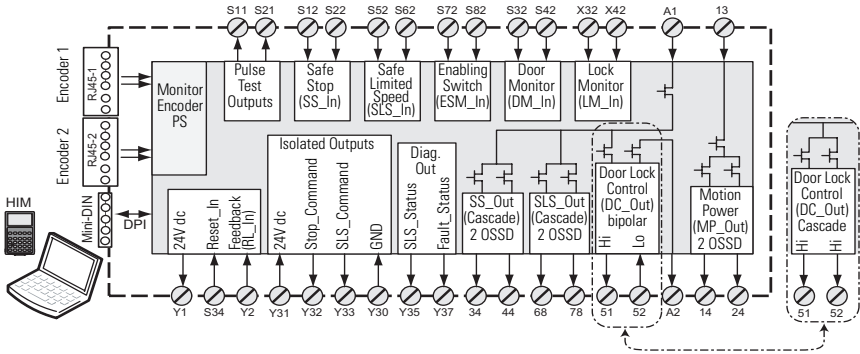


# Terminal Connections

| Terminal | Function |
|----------|----------|
| A1 | +24V dc, user supply |
| A2 | Common, user supply |
| S11, S21 | Test_Out_0, Test_Out_1, pulse test outputs for safety functions |
| S12, S22 | SS_In_Ch0, SS_In_Ch1, Safe Stop (SS) dual-channel input |
| S72, S82 | ESM_In_Ch0, ESM_In_Ch1, Enabling Switch Monitor (ESM) dual-channel input |
| S52, S62 | SLS_In_Ch0, SLS_In_Ch1, Safe Limited Speed (SLS) dual-channel input |
| S32, S42 | DM_In_Ch0, DM_In_Ch1, Door Monitor (DM) dual-channel input |
| X32, X42 | LM_In_Ch0, LM_In_Ch1, Lock Monitor (LM) dual-channel input, solenoid position |
| Y1 | 24V dc output for reset (S34) and for feedback (Y2) |
| S34 | Reset_In |
| Y2 | RL_In, feedback input |
| Y35 | SLS_Status output |
| Y37 | Fault_Status output |
| 13 | Supply power for Motion Power (MP) safety outputs 14 and 24 |
| 14, 24 | MP_Out_Ch0, MP_Out_Ch1, Motion Power (MP) outputs |
| 68, 78 | SLS_Out_Ch0, SLS_Out_Ch1, Safe Limited Speed (SLS) outputs |
| 51 | DC_Out_Ch0 (High Side), Door Control output [door switch solenoid, bipolar or cascading[1]] |
| 52 | DC_Out_Ch1 (Low Side), Door Control output [door switch solenoid, bipolar or cascading[1]] |
| 34, 44 | SS_Out_Ch0, SS_Out_Ch1, cascading Safe Stop outputs |
| Y31 | 24V dc power for isolated outputs |
| Y32 | Stop_Command, isolated output |
| Y33 | SLS_Command, isolated output |
| Y30 | GND for isolated outputs |

(1) The DC_Out output may also be configured as cascading (2 Channel Source). For information on using this configuration in limited applications, refer to the GuardMaster Speed Monitoring Safety Relay User Manual, publication 440R-UM004.

## Status Indicators

| Indicator | Status | Description |
|---|---|---|
| PWR/Fault[1] | Green/On | The device is operating normally and is in Run mode. |
| | Red/Flashing | A recoverable fault has occurred. |
| | Red/On | A nonrecoverable fault has occurred. |
| | Red/Green Flashing | The configuration is being downloaded or a firmware upgrade is in progress. |
| Config Lock[1] | Yellow/On | The device's configuration is locked. |
| | Yellow/Flashing | The device's configuration is unlocked. |
| Stop | Green/On | The Safe Stop (SS) input is closed. |
| | Red/On | The SS input is open or pressed. |
| | Red/Flashing | The SS input has a fault. |
| Limited Speed | Green/On | The Safe Limited Speed (SLS) input is closed for normal Run operation. |
| | Green/Flashing | The SLS input is open for a safe speed request to allow access to the machine (Maintenance operation). |
| | Off | The SLS function is not configured. |
| | Red/Flashing | The SLS input has a fault. |
| Motion Power | Green/On | The Motion Power (MP) output is ON. |
| | Off | The MP output is OFF. |
| | Red/Flashing | The MP output has a fault. |
| Door | Green/On | The door is closed. |
| | Red/On | The door is open. |
| | Red/Flashing | Door Monitor or Lock Monitor input switch has a fault. |
| | Off | Door monitoring is not configured. |
| Safe Speed | Green/On | Safe Limited Speed is being actively monitored and is below the configured Safe Limited Speed value after an SLS request has been made. |
| | Off | Safe Limited Speed is not being monitored. |
| | Red/Flashing | An SLS Speed Fault has occurred. |
| Standstill | Green/On | Standstill Speed has been detected. |
| | Off | Speed is greater than the configured Standstill Speed. |
| | Red/Flashing | Motion has been detected after stopped condition or a Stop Speed Fault has occurred. |

(1)   PWR/Fault green indicator and Config Lock indicator flash in synch when the device is in Program mode.

When you apply power to the device, the red/green indicators flash alternate colors twice and the Config Lock indicator flashes on and off twice before all indicators except for the PWR/Fault indicator turn off.  The PWR/Fault indicator remains flashing until the device enters Run or Program mode.

# Specifications

## GuardMaster MSR57P Speed Monitoring Safety Relay – 440R-S845AER-NNL

| Attribute | Value |
|---|---|
| Standards | IEC/EN60204-1, ISO12100, IEC 61800-5-2 |
| Safety category | Cat. 4 and PL e per EN ISO 13849-1; SIL CL1 to CL3 per IEC 61508/EN62061 |
| Power supply | 24V dc, 0.8…1.1 x rated voltage[3] PELV/SELV |
| Aggregate current of MSR57P | 10.4 A max. @ terminal A1 + 13 |
| Power consumption | 5 W |
| Outputs 14, 24, 68, 78 | 24V dc, 2 A, short-circuit protected |
| Outputs 34, 44 | 24V dc, 100 mA, short-circuit protected |
| Outputs Y35, Y37 | 24V dc, 50 mA, short-circuit protected |
| Door switches 51, 52[1] | 24V dc, short-circuit protected<br>• 1.5 A, bipolar (Power to Release/Power to Lock) configuration<br>• 20 mA, cascading (2 Channel Source) configuration |
| Outputs Y32, Y33 | 24V dc, 100 mA, short-circuit protected |
| Output Y1 | 24V dc, 20 mA, short-circuit protected |
| Pulse outputs S11, S21 | 24V dc, 100 mA, short-circuit protected |
| Pulse inputs S12, S22, S32, S42, S52, S62, S72, S82, X32, X42 | 11 mA per input, max |
| Inputs S34, Y2 | 11 mA per input, max |
| Power-on delay, max | 3 s |
| Response time | User-configurable.[4] |
| Pollution degree | 2 |
| Enclosure protection | IP40 |
| Terminal protection | IP20 |
| Wire Type | Use copper that will withstand 60/75 °C (140/167 °F) |
| Conductor size[2] | 0.2…2.5 mm$^2$ (12…24 AWG) |
| Terminal screw torque | 0.6…0.8 Nm (5…7 lb-in) |
| Case material | Polyamide PA 6.6 |
| Mounting | 35 mm DIN rail |
| Weight, approx. | 350 g (0.77 lb) |

(1) For information on using these outputs in bipolar or cascading configurations, refer to the GuardMaster Speed Monitoring Safety Relay, publication 440R-UM004.
(2) Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.
(3) Safety outputs need additional fuse for reverse voltage protection of the control circuit. Install a 6 A slow-blow or 10 A fast-acting fuse.
(4) Refer to the GuardMaster MSR57P Speed Monitoring Safety Relay User Manual, publication 440R-UM004 for details.

**Environmental Specifications**

| Attribute | Value |
|---|---|
| Temperature, operating | -5…55 °C (23…131 °F) |
| Relative humidity | 90% RH noncondensing |
| Vibration | 10…55 Hz, 0.35 mm displacement |
| Shock, operating | 10 g, 16 ms, 100 shocks |
| ESD immunity | 4 kV contact discharges; 8 kV air discharges |
| Radiated RF immunity | 10 V/m from 80…1000 MHz; 3 V/m from 1.4…2.0 GHz;  1V/m from 2.0…2.7GHz |
| EFT/B immunity | Power, dc: ±2 kV<br>I/O signal lines: ±1 kV |
| Surge transient immunity | Power, dc: ±0.5 kV line-line and ±0.5 kV line-earth<br>I/O signal lines: ±1 kV line-earth |
| Conducted RF immunity | 10V rms from 150 kHz…80 MHz |

**Certifications**

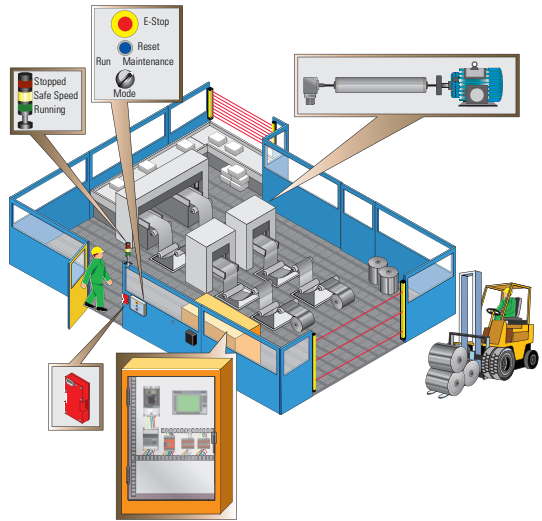| Certification[1] | Value |
|---|---|
| c-UL-us | UL Listed, certified for US and Canada. |
| CE | European Union 2004/108/EC EMC Directive, compliant with:<br><br>• EN 61000-6-4; Industrial Emissions.<br><br>• EN 61131-2 Programmable Controllers (Clause 8, Zone A & B).<br><br>• EN 61326-3-1; Meas./Control/Lab., Industrial Requirements.<br><br>• EN 61000-6-2; Industrial Immunity. |
| C-Tick | Australian Radiocommunications Act, compliant with:<br>AS/NZS CISPR 11; Industrial Emissions. |
| TÜV | TÜV Certified for Functional Safety: SIL CL1 to CL3, according to IEC 61508/EN62061; Category 1 to 4 and Performance Level e, according to EN ISO 13849-1, when used as described in the GuardMaster MSR57P Speed Monitoring Safety Relay User Manual, publication 440R-UM004. |

(1) When product is marked. See the Product Certification link at http://ab.com for Declarations of Conformity, Certificates, and other certifications details.
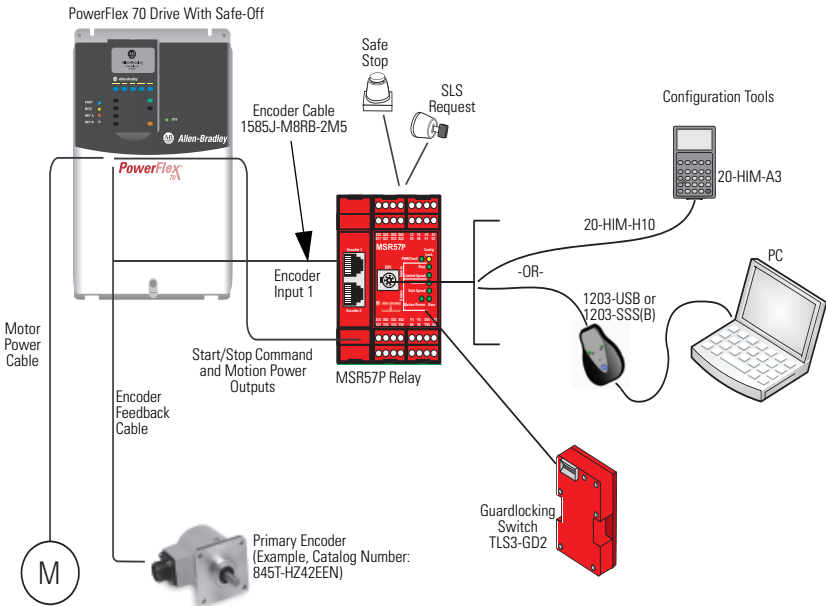
# Application Example 1

This example is configured for Safe Stop 1. The control cabinet contains an MSR57P relay, a PowerFlex 70 AC Drive with Safe-Off function, as well as a PanelView terminal. The MSR57P relay monitors speed via a TTL encoder connected to the PowerFlex 70 drive.

The control panel lets the operator select Run or Maintenance speeds. The door has an interlock switch with guardlocking to limit access to the machine when the machine is operating at normal Run speed.
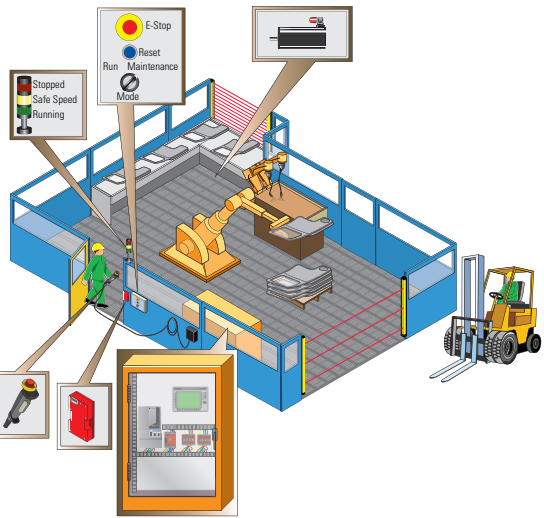
A towerlight indicates machine status.



## Example 1: System Layout

## Example 1: System Wiring



(1) Digital input 4.
Proper configuration is required for inputs 1, 2, 4, and 6 on the PowerFlex 70 Drive.
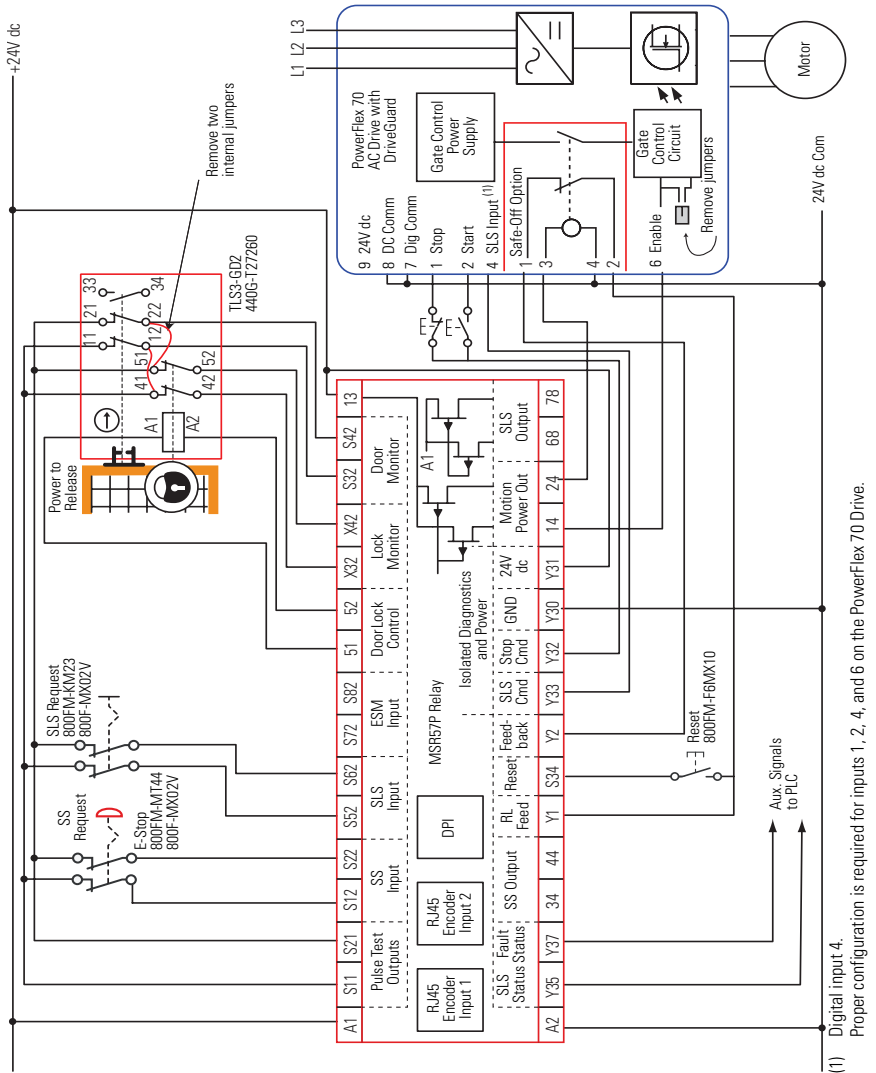
# Application Example 2

This example is configured for Safe Stop 1. The control cabinet contains an MSR57P relay, a Kinetix 6000 drive with Safe-Off function, as well as a PanelView terminal. The MSR57P relay monitors speed via a Sin/Cos encoder connected to the Kinetix 6000 drive.

The control panel lets the operator select Run or Maintenance speeds. The door has an interlock switch with guardlocking to limit access to the machine when the machine is operating at normal Run speed. In addition, an enabling switch is required to be held in the middle position while operators are within the machine environment to keep the machine running at safe speed.

A towerlight indicates machine status.



## Example 2 System Layout
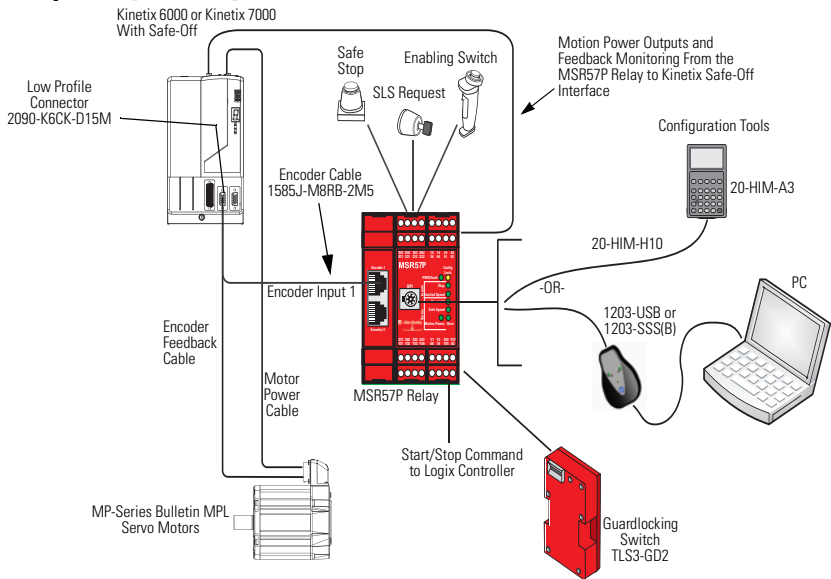
## Example 2:  System Wiring
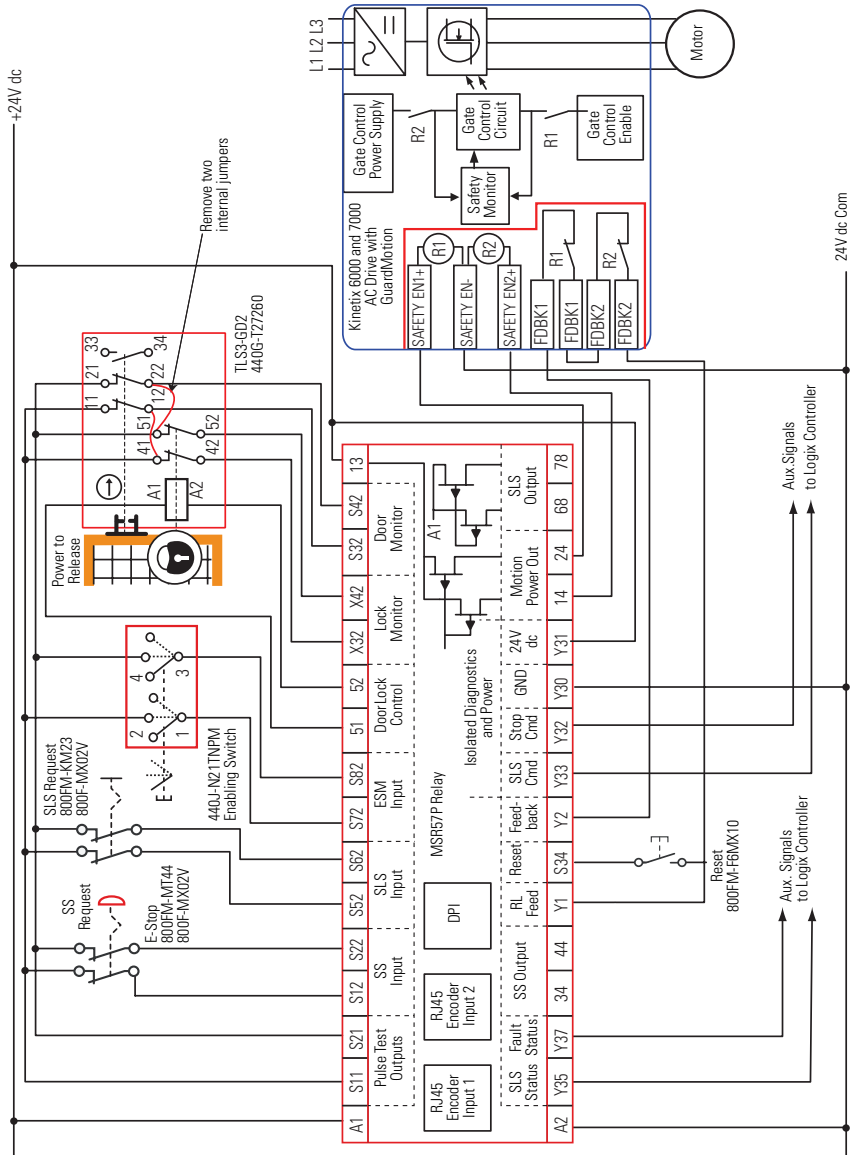
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